HARRICK SCIENTIFIC PRODUCTS

No. 21160

# COMPARISON OF THE SI AND EXTENDED SI ATR SAMPLING PLATES FOR THE CONCENTRATIR2

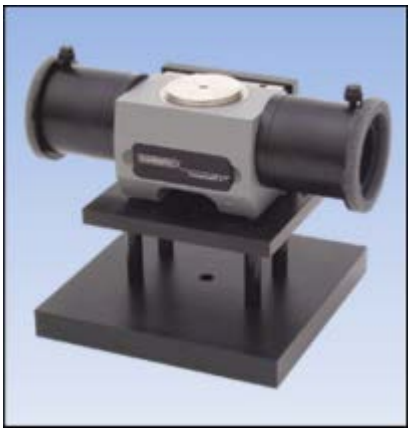

Figure 1. The Harrick ConcentratIR2™ multiple reflection ATR accessory.

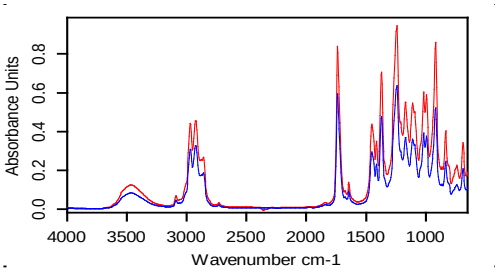


Figure 2. Spectra of lavender oil using Si ATR sampling plate (blue), and extended Si ATR sampling plate (red).

## INTRODUCTION

The ConcentratIR2™ is a miniature multiple-reflection ATR accessory that is designed for micro-liquid samples. It features an interchangeable silicon ATR sampling plate. The purpose of this study was to determine the differences between the Si ATR Sampling Plate and the extended Si ATR Sampling Plate.

## EXPERIMENTAL

All IR spectra were collected on a commercial FT-IR spectrometer with the ConcentratIR2™ placed in the sample compartment, using a DTGS detector. All spectra were produced from 32 averaged scans at a resolution of 8 $cm^{-1}$. The gain was set to 1, the aperture was set to 100, and spectra were collected in the range 4000-650 $cm^{-1}$. The samples used for the study were lavender essential oil (Aura Cacia, undiluted 100% Pure), Nujol (white paraffin oil, Matheson Coleman & Bell Chemicals), Scope (Crest classic original mint mouth-wash) and the protein Bovine Gamma Globulin (Thermo Scientific) at a concentration of 125 UG/mL. Each sample was analyzed by placing one drop, using a pipette, on the Si ATR crystal. Since lavender oil is a volatile substance, the volatiles cover was used to maintain consistency in the spectra.

## RESULTS AND DISCUSSION

Figure 2 shows the absorbance spectra of lavender oil recorded using the two different Silicon configurations, the Si ATR Sampling Plate and the extended Si ATR Sampling Plate. Figure 3 shows the absorbance spectra of Nujol recorded using the two different Silicon configurations.

Comparing the absorbance values shows that the extended Si ATR sampling plate is approximately 1.5 times more sensitive than the Si ATR sampling plate. This is lower than the theoretically expected doubling of intensity, but not surprisingly so as the prediction is based solely on central ray and does not take into account the spectrometer beam spread.

Figure 4 displays the absorbance spectra of Scope recorded using the two different silicon configurations. In this aqueous sample, no saturation was observed in the spectra for either configuration. So the increased number of reflections offered by the extended Si ATR sampling plate is suitable for use

applications note

with strongly absorbing samples like water.

Figure 5 exhibits the absorbance spectra of the protein BGG using the two different Si configurations. The extended Si ATR sampling plate is again roughly 1.5 times more sensitive than the Si ATR sampling plate. Because the overall band intensities are stronger, the underlying, obscured protein bands will also be stronger. This means they should be easier to extract when water is subtracted and it may be possible to detect lower concentrations of proteins in aqueous solutions using the extended sampling plate.

## CONCLUSION

The ATR spectra of the lavender oil, scope, Nujol and BGG illustrates that the extended silicon ATR sampling plate has enhanced sensitivity over the standard Si sampling plate. The extended sampling plate increases sensitivity by a factor of approximately 1.5 allowing improved analysis of weaker peaks and lower concentration components with little risk of saturating more strongly absorbing species.

Additional work is in progress to investigate the potential for using this increased sensitivity to lower detection limits for proteins.

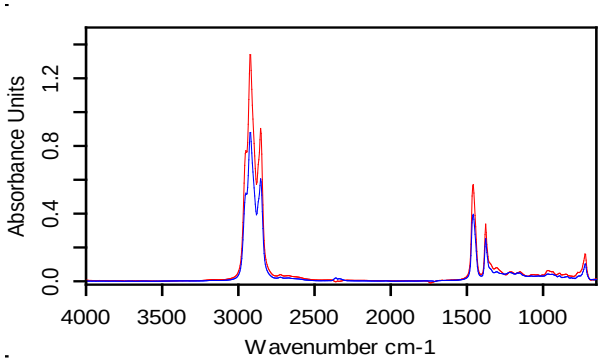


Figure 3. Spectra of Nujol using Si ATR sampling plate (blue), and extended Si ATR sampling plate (red).

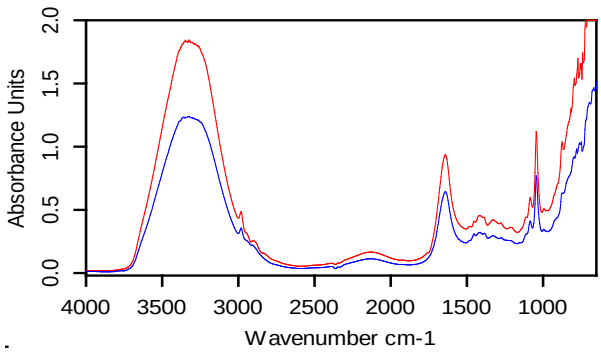


Figure 4. Spectra of Scope using Si ATR sampling plate (blue), and extended Si ATR sampling plate (red).

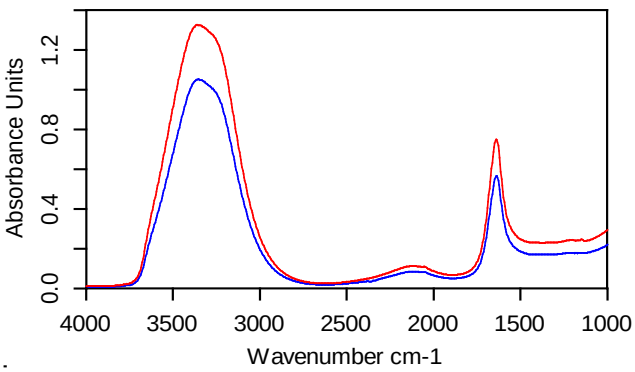


Figure 5. Spectra of BGG using Si ATR sampling plate (blue), and extended Si ATR sampling plate (red).

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